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EXAMINER

BLOOM, NATHAN J

ART UNIT

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2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/528,533	Applicant(s) NEW ET AL.	
	Examiner NATHAN BLOOM	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/21/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 38 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, each of the lines 3, 6-7, and 8-9 of the claim contain the phrase "of the or each input image and reference frame". It is not understood what exactly this language means, but in the interest of furthering the prosecution of this application the Examiner will interpret it to mean "of the input image". Please amend the claim language appropriately to clarify this claim limitation.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 20-21, 23-25, 27-32, and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by O'Callaghan (US 6369933).

Instant claim 20: An optical correlator [*column 6 line 1*] having an image production device [*SLM 104 and 106 of column 9 lines 29-47, figure 4*], an image capture device [*imager 114*,

Art Unit: 2624

figure 4] and an optical device for providing a Fourier transform of image information [*Lens 120, figure 4]* on the image production device at the image capture device, wherein the image production device [*SLM 104 and 106*] and image capture device [*imager 114*] are disposed in a common plane. [*See figure 4 where these components reside in a common plane (column 9 lines 29-47).*]

Instant claim 21: The optical correlator of claim 20, wherein the image production device and the image capture device are integrated on a common substrate. [*Figure 4 depicts the devices residing on the same circuit die and substrate (column 6 line 66 to column 7 line 15).*]

Instant claim 23: The optical correlator of claim 20, wherein the image production device has plural image production elements, the image capture device has plural image capture elements and each image production element includes an image capture element. [*O'Callaghan has taught in column 15 lines 28-39 a SLM with 212x212 pixels and an imager with 256x256. Thus for each production element (SLM element) there is included at least one image capture element.*]

Instant claim 24: The optical correlator of claim 20, wherein the image production device and the image capture device are spatially separate. [*Figure 4 depicts the two devices (SLM 104 and imager 114) as two separate entities (column 6 lines 25-40).*]

Art Unit: 2624

Instant claim 25: The optical correlator of claim 20, wherein the optical device comprises at least one positive power optical device arranged to receive light from the image production device and to pass light back to the image capture device. [(Note: A positive power optical device is one that causes convergence of the light from the device.) O'Callaghan has taught in column 20 lines 15-37, table 1, and column 13 lines 53+, that the distance d is negative (when f is less than f_l , supplied from the table - using provided equation $1/f_l = 1/d + 1/f$ to determine equality statement) from SLM 104 to the light source.]

Instant claim 27: The optical correlator of claim 25, wherein the positive power optical device comprises a planar mirror and a positive power lens. [As per the discussion of claim 25 folding (planar) mirrors are used in conjunction with SLMs and lens to produce a convergent beam.]

Instant claim 28: The optical correlator of claim 20, having circuitry for applying reference image [input image data at 1st SLM] data to one part of the image production device, and circuitry for providing reference scene data [reference image at 2nd SLM] to another distinct part of the image production device. [Refer to column 4 lines 25-43 and column 8 lines 33-46 (circuitry).]

Instant claim 29: The optical correlator of claim 20, wherein the image production device is operable to provide phase modulation of incident light according to applied image data. [The SLM devices have polarizing devices (column 7 line 40 to column 6 line 16) that modulate the intensity and phase (column 20 lines 38-57).]

Art Unit: 2624

Instant claim 30: The optical correlator of claim 20, wherein the image production device has two output levels only. [*As per the discussion above, O'Callaghan has taught the use of ferroelectric liquid crystal devices which are two state devices (see Applicant's disclosure in paragraph 0017 of the US PG-PUB of the application)*]

Instant claim 31: The optical correlator of claim 20, wherein the image production device comprises a ferroelectric liquid crystal on silicon spatial light modulator. [*Column 6 lines 41-56.*]

Instant claim 32: The optical correlator of claim 20, wherein the image production device comprises one from the group comprising a nematic liquid crystal on silicon spatial light modulator, a pi-cell spatial light modulator and a microelectromechanical systems (MEMS) spatial light modulator. [*Column 6 lines 41-56 (nematic liquid crystal).*]

Instant claim 38: A method of correlating at least one input image with at least one reference image, the method comprising:

illuminating a representation of the or each input image and the or each reference image with coherent light to provide a first light beam; and, [*Column 9 lines 29-47, wherein the input image is displayed on the SLM (first light beam).*]

Art Unit: 2624

passing the first light beam to an optical device disposed to provide a second image at a plane, the second image being a Fourier transform of the or each input image and reference images, [*The first light beam is then passed through a polarizing mirror and the second SLM and Lens, wherein the Fourier transform of the filtered image is projected.*]

wherein the second image is formed co-planar with the representation of the or each input image and reference image. [As per the earlier discussion, the SLMs that project the first and second image (input image and Fourier transform of input image) are on a common plane (co-planar).]

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 22 rejected under 35 U.S.C. 103(a) as being unpatentable over O'Callaghan as applied to claim 20 above, in further view of Freyre (US 5987188).

Instant claim 22: The optical correlator according to claim 20, wherein the image production device has plural image production elements, the image capture device has plural image capture elements and the image capture elements are interspersed with the image production elements.

Art Unit: 2624

[O'Callaghan has taught the image production device and capture device as being on the same plane and in close proximity to reduce the size of the device, but has not taught the elements are interspersed (share the same footprint). However, Freyre has taught an optical correlator (designed for increased compactness) in figure 2 and columns 3-4 an overlapped array of image production and capture elements. It would have been obvious to one of ordinary skill in the art to modify the optical correlator of O'Callaghan with the teachings of Freyre to overlap the arrays of elements in an optical correlator to reduce the size of the device.]

7. Claim 26 rejected under 35 U.S.C. 103(a) as being unpatentable over O'Callaghan as applied to claim 25 above.

Instant claim 26: The optical correlator of claim 25, wherein the positive power optical device comprises a curved mirror. *[As per the discussion of claim 25 the use of convergent optical devices was taught by O'Callaghan, but O'Callaghan has only taught the use of a single mirror type (folding). However, Examiner takes official notice that it was well known to one of ordinary skill in the art at the time of the invention to utilize an equivalent convergent mirror device such as a concave curved mirror to reflect and converge the light. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of O'Callaghan with the knowledge of one of ordinary skill in the art to utilize and substitute known mirror types that fit the requirements of the taught optical correlating device of O'Callaghan.]*

8. Claims 33-34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Callaghan as applied to claim 20 above, and further in view of Okuyama (US 2001/0050366).

Instant claim 33: A pixellated image capture device for a joint transform correlator, the capture device being constructed and arranged to provide an electrical signal per pixel representative *[Definition of a CMOS or CCD type capture device as was described by O'Callaghan.]* of the quantity of light received at the pixel wherein the image capture device is integrated on a silicon substrate *[See the discussion of claim 1 wherein a capture device in a silicon substrate was disclosed.]*, and the integrated device further comprises processing circuitry constructed and arranged to compare the electrical signal of each pixel of the image capture device against a threshold, and to provide an output signal per pixel in accordance with the comparison result. *[As per the discussion of Claim 20 and the above comments, O'Callaghan has taught the optical correlation device with SLM devices and a captured device on a common plane, but has not taught the thresholding of the pixel values. However, Okuyama has taught the correction of fixed pattern noise (caused by bias current due to threshold voltage levels in the transistor) in image capture devices by comparing the pixel signal to a threshold signal (paragraph 0016), and outputting a 1 or 0 to a counter. It would have been obvious to one of ordinary skill in the art to modify the image capture device of O'Callaghan with the noise correction system of Okuyama to reduce known noise, thus enhancing the quality of the image data.]*

Art Unit: 2624

Instant claim 34: The pixellated image capture device of claim 33, wherein the threshold is formed from the electrical signals of at least one pixel adjoining the said pixel. *[Okuyama has taught the correction of pixel noise due to bias current by applying a threshold, and determining a count of the number of pixels that meet the criteria. Furthermore, the fixed pattern noise is based on bias voltage caused by transistor threshold voltages between adjoining pixels. Thus the selected threshold based on the bias current is also based on the signals of the adjoining pixels (as evidenced by the teachings of Brehmer US 2002/0011554 in paragraph 0026)]*

Instant claim 39: An integrated circuit comprising a liquid crystal on silicon spatial light modulator and an image capture device, the spatial light modulator having an array of light modulating elements and the image capture device having an array of light capture elements, wherein each light capture element is arranged to provide an output representative of the light picked up by the respective capture element *[See the discussion of claims 20 and 33.]*, the integrated circuit further having processing circuitry for each capture element constructed and arranged to process the output of the said capture element together with the output of at least a respective one other capture element and to provide a first output from each capture element in response to such processing, the capture array further having output circuitry for outputting the unprocessed output of each capture element. *[See the discussion of claims 33 and 34.]*

Art Unit: 2624

9. Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Callaghan in view of Okuyama as applied to claim 20 above, and further in view of Pu et. al. (US 2001/0007592).

Instant claim 35: The pixellated image capture device of Claim 33, comprising a pixellated image production device, wherein the processing circuitry is constructed and arranged to provide each output signal per pixel to a respective pixel of the image production device. *[As per the discussion above, O'Callaghan in view of Okuyama has taught the device of claim 33. However, O'Callaghan in view of Okuyama have not taught the displaying (pixellated image production device is being interpreted as a display device) of the output image of the image capture device. Pu has taught a method of optical correlation, and in paragraph 0038 Pu has taught that the device is connected to a display that displays information to the user such as the results of the optical correlation. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of O'Callaghan in view of Okuyama to include a display device as taught by Pu in order to inform the user of the results.]*

Instant claim 36: The pixellated image capture device of Claim 35, having output circuitry for reading out unprocessed information from each pixel of the image capture device. *[In order to output the information of the capture device for processing, as taught by O'Callaghan in view of Okuyama in the discussion of claim 33, there must be interconnections of circuitry to carry the*

Art Unit: 2624

signals. Therefore, this limitation is inherent to the teachings of O'Callaghan in view of Okuyama.]

10. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over O'Callaghan in view of Okuyama and Pu as applied to claims 35-36 above, and further in view of Yamazaki (US 2001/0019130).

Instant claim 37: The pixellated image capture device of Claim 36, wherein the pixellated image production device is integrated on the same substrate as the image capture device. [*O'Callaghan in view of Okuyama and Pu have taught an optical correlation device that displays the results to a user, but not utilizing the same substrate material. However, Yamazaki has taught a device for capturing and displaying light on the same substrate in paragraph 0009. Furthermore, the claim language as currently provided only requires that the substrate be the same material, and not that the devices reside on the same chip. The teachings of Yamazaki identify that the same substrate material can be used to for both capturing and displaying light images, and that they can reside on the same chip. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of O'Callaghan in view of Okuyama and Pu to display the image on the same type of substrate as used for capture device in order to reduce cost by utilizing similar materials. Furthermore, the alternative combination of these references wherein the display device resides on the same chip would provide a reduction in size of the device by utilizing the same space for both the capture and display device.]*

Art Unit: 2624

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Matthew C Bella/

Supervisory Patent Examiner, Art Unit 2624